

In the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Please amend Claims 3, 5, 6, 8, 9, 14, 15, 28, and 32, and cancel Claims 1, 2, 7, 10, 13, 16, 17, 24, 25, 26, 27, 29, 30 and 31.

1. (cancelled)

2. (cancelled)

3. (currently amended) ~~The method of Claim 2,~~ A method of generating a frame quantization parameter for encoding a current frame of an incoming video stream having a plurality of frames, the method comprising:

calculating a complexity ratio of the current frame, wherein the calculating a complexity ration of the current frame comprises:

calculating a local complexity of the current frame; wherein the calculating a local complexity of the current frame comprises:

calculating a new average local complexity; and

calculating a new value for the local complexity as a weighted average of a current value of the local complexity and the new average local ~~complexity.~~ complexity;

calculating a global complexity of a plurality of frames; and

setting the complexity ratio to equal the local complexity divided by the global complexity;

calculating a current frame bit rate using the complexity ratio of the current frame;

calculating the frame quantization parameter based on the current frame bit rate.

4. (original) The method of Claim 3, wherein the new average local complexity is equal to a weighted average of a plurality of frame complexities weighted by a plurality of frame types.

5. (currently amended) ~~The method of Claim 2,~~ A method of generating a frame quantization parameter for encoding a current frame of an incoming video stream having a plurality of frames, the method comprising:

calculating a complexity ratio of the current frame, wherein the calculating a complexity ration of the current frame comprises:

calculating a local complexity of the current frame;

calculating a global complexity of a plurality of frames, wherein the global complexity is a long term average of the local ~~complexity.~~ complexity;
and

setting the complexity ratio to equal the local complexity divided by the global complexity;

calculating a current frame bit rate using the complexity ratio of the current frame;

calculating the frame quantization parameter based on the current frame bit rate;

6. (currently amended) ~~The method of Claim 2,~~ A method of generating a frame quantization parameter for encoding a

current frame of an incoming video stream having a plurality of frames, the method comprising:

calculating a complexity ratio of the current frame, wherein the calculating a complexity ration of the current frame comprises:

calculating a local complexity of the current frame;

calculating a global complexity of a plurality of frames, wherein a new value for global complexity is equal to a global complexity coefficient times the local complexity plus a current value of the global complexity times one minus the global complexity ~~coefficient~~ coefficient; and

setting the complexity ratio to equal the local complexity divided by the global complexity;

calculating a current frame bit rate using the complexity ratio of the current frame;

calculating the frame quantization parameter based on the current frame bit rate.

7. (cancelled)

8. (currently amended) ~~The method of Claim 7,~~ A method of generating a frame quantization parameter for encoding a current frame of an incoming video stream having a plurality of frames, the method comprising:

calculating a complexity ratio of the current frame;

calculating a current frame bit rate using the complexity ratio of the current frame;

calculating the frame quantization parameter based on the current frame bit rate; and

calculating a bit balance adjustment factor that is used in the calculating a current frame bit rate using the complexity ratio, wherein calculating a bit balance adjustment factor comprises:

tracking a bit balance of a plurality of previously processed frames; and

dividing the bit balance by a duration to generate the bit balance adjustment factor.

9. (currently amended) ~~The method of Claim 7,~~ A method of generating a frame quantization parameter for encoding a current frame of an incoming video stream having a plurality of frames, the method comprising:

calculating a complexity ratio of the current frame;
calculating a current frame bit rate using the complexity ratio of the current frame;

calculating the frame quantization parameter based on the current frame bit rate; and

calculating a bit balance adjustment factor that is used in the calculating a current frame bit rate using the complexity ratio, wherein the current frame bit rate is equal to the bit balance adjustment value plus a rate control parameter multiplied by the complexity ratio multiplied by a frame target rate plus the frame target rate multiplied by the difference between one and the rate control parameter.

10. (cancelled)

11. (cancelled)

12. (cancelled)

13. (cancelled)

14. (currently amended) ~~The method of Claim 13,~~ A method of generating a frame quantization parameter for encoding a current frame of an incoming video stream having a plurality of frames, the method comprising:

calculating a complexity ratio of the current frame;
calculating a current frame bit rate using the complexity ratio of the current frame;

calculating a frame coding efficiency factor; and
calculating the frame quantization parameter based on the current frame bit rate, wherein the calculating the frame quantization parameter based on the current frame bit rate comprises:

calculating a bit budget for the current frame using the current frame bit rate;

calculating an average macroblock quantization factor of a previous frame, wherein the previous frame and the current frame have a same frame type; and

calculating the frame quantization parameter using the bit budget; the average macroblock quantization factor of the previous frame, and a bit usage of the previous frame; and

wherein the frame quantization parameter is equal to one fourth of the average macroblock quantization factor multiplied by the sum of three plus the bit usage divided by the bit budget.

15. (currently amended) ~~The method of Claim 1, further comprising~~ A method of generating a frame quantization parameter for encoding a current frame of an incoming video stream having a plurality of frames, the method comprising:

calculating a complexity ratio of the current frame;

calculating a current frame bit rate using the complexity ratio of the current frame;

calculating the frame quantization parameter based on the current frame bit rate; and

calculating an underflow quantization parameter for each macroblock of the current ~~frame.~~ frame; wherein the comprising calculating an underflow quantization parameter for each macroblock of the current frame comprises:

calculating a maximum macroblock bit budget;

tracking a total bit usage for the current frame;

tracking a count of a number of processed macroblocks; and

calculating the underflow quantization parameter using the maximum macroblock bit budget, the total bit usage, and the count, wherein a new value of the underflow quantization parameter is equal to a current value of underflow quantization parameter multiplied by one plus the total bit usage minus a product of the count and the maximum macroblock bit budget divided by the maximum macroblock bit budget.

16. (cancelled)

17. (cancelled)

18. (original) The method of Claim 15 further comprising applying activity masking to generate a macroblock quantization parameter using the underflow quantization parameter.

19. (previously presented) A method of creating macroblock quantization parameters for a current frame using a frame quantization parameter, the method comprising:

 setting an initial value of the macroblock quantization value to be equal to the frame quantization parameter;

 calculating a maximum macroblock bit budget;

 tracking a total bit usage for the current frame;

 tracking a count of a number of processed macroblocks;

 calculating the underflow quantization parameter using the maximum macroblock bit budget, the total bit usage, and the count, wherein a new value of the underflow quantization parameter is equal to a current value of underflow quantization parameter multiplied by one plus the total bit usage minus a product of the count and the maximum macroblock bit budget divided by the maximum macroblock bit budget.

20. (cancelled)

21. (original) The method of Claim 19 further comprising applying activity masking to each macroblock.

22. (original) The method of Claim 19, further comprising calculating the frame quantization parameter.

23. (original) The method of Claim 22, wherein the calculating the frame quantization parameter comprises:

 calculating a complexity ratio;

 calculating a current frame bit rate using the complexity ratio factor; and

 calculating the frame quantization parameter based on the current frame bit rate.

24. (cancelled)

25. (cancelled)

26. (cancelled)

27. (cancelled)

28. (currently amended) A system for generating a frame quantization parameter for encoding a current frame of an incoming video stream having a plurality of frames, the system comprising:

means for calculating a complexity ratio of the current frame;

means for calculating a current frame bit rate using the complexity ratio of the current frame; and

means for calculating the frame quantization parameter based on the current frame bit ~~rate~~ rate; and

wherein the means for calculating a complexity ratio comprises:

means for calculating a local complexity of the current frame;

means for calculating a global complexity of a plurality of frames; and

means for setting the complexity ratio to equal the local complexity divided by the global complexity; and

wherein the means for calculating a local complexity comprises:

means for calculating a new average local complexity; and

means for calculating a new value for the local complexity as a weighted average of a

current value of the local complexity and the
new average local complexity.

29. (cancelled)

30. (cancelled)

31. (cancelled)

32. (currently amended) ~~The system of Claim 31,~~ A system
for generating a frame quantization parameter for encoding a
current frame of an incoming video stream having a plurality
of frames, the system comprising:

means for calculating a complexity ratio of the
current frame;

means for calculating a current frame bit rate using
the complexity ratio of the current frame;

means for calculating the frame quantization
parameter based on the current frame bit rate; and

means for calculating a bit balance adjustment
factor that is used by the means for calculating a
current frame bit rate using the complexity ratio factor;

wherein the means for calculating a bit balance
adjustment factor comprises:

means for tracking a bit balance of a plurality
of previously processed frames;

means for dividing the bit balance by a
duration to generate the bit balance adjustment
factor.

33. (original) The system of Claim 28, further means for
comprising calculating a frame coding efficiency factor.

34. (original) The system of Claim 33, wherein the means for calculating the frame quantization parameter based on the current frame bit rate comprises:

means for calculating a bit budget for the current frame using the current frame bit rate;

means for calculating an average macroblock quantization factor of a previous frame, wherein the previous frame and the current frame have a same frame type;

means for calculating the frame quantization parameter using the bit budget; the average macroblock quantization factor of the previous frame, and a bit usage of the previous frame.

35. (original) The system of Claim 28, further comprising means for calculating an underflow quantization parameter for each macroblock of the current frame.

36. (previously presented) A system for creating macroblock quantization parameters for a current frame using a frame quantization parameter, the system comprising:

means for setting an initial value of the macroblock quantization value to be equal to the frame quantization parameter;

means for calculating a maximum macroblock bit budget;

means for tracking a total bit usage for the current frame;

means for tracking a count of a number of processed macroblocks;

means for calculating the underflow quantization parameter using the maximum macroblock bit budget, the total bit usage, and the count; wherein a new value of

the underflow quantization parameter is equal to a current value of underflow quantization parameter multiplied by one plus the total bit usage minus a product of the count and the maximum macroblock bit budget divided by the maximum macroblock bit budget.

37. (cancelled)

38. (original) The method of Claim 36 further comprising means for applying activity masking to each macroblock.

39. (original) The system of Claim 36, further comprising means for calculating the frame quantization parameter.

40. (original) The system of Claim 39, wherein the means for calculating the frame quantization parameter comprises:

means for calculating a complexity ratio;

means for calculating a current frame bit rate using the complexity ratio factor; and

means for calculating the frame quantization parameter based on the current frame bit rate.